IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

EX PARTE Luo et al.

Application for Patent

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Serial No. 10/065,091

FOR:

LIQUID CRYSTAL DISPLAY STRUCTURE

APPEAL BRIEF

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I. Real party in interest

The real parties in interest are Fang-Chen Luo and Wei-Chih Chang, the inventors named in the subject application, and Au Optronics Corporation, the assignee of record.

II. Related appeals and interferences

To the best of Appellants' and Appellants' representatives' knowledge, there are no related appeals and/or interferences which will directly affect or be directly affected by the Board's decision in the present pending appeal.

III. Status of the claims

A total of 43 claims were presented during prosecution of this application of which claims 1-23, 34-43 were cancelled, claims 24-33 were withdrawn, and claims 44-67 were added. Out of the claims 44-67, claims 44-55 were withdrawn and claims 60-61 were cancelled. Appellants appeal rejected claims 56-59 and 62-67.

IV. Status of amendments

An amendment was filed on September 12, 2008. The Final Office Action issued on December 11, 2008 indicated that the amendment of September 12, 2008 would be entered. Accordingly, all amendments to the claims are believed to have been entered and considered on the merits. A copy of the pending claims, including the changes made in the after-final amendment, is presented in the attached Claims Appendix.

V. Summary of claimed subject matter

The claimed subject matter of the present invention involved in the appeal, as recited in claim 56, is directed to a liquid crystal structure. The structure comprises a first substrate panel 50b, a second substrate panel 50a and a liquid crystal layer 54 disposed between the

first and the second substrate panels 50b, 50a (pages 12-13, Figure 2). The structure also comprises a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer 54 (pg. 12, ln. 20 to 24). Each of the pixel portions comprises an organic insulating layer 66 over the first substrate panel 50b, wherein a surface of the organic insulating layer has a plurality of protrude/recess structures thereon (pg. 12, ln. 9-12). Each of the pixel portions also comprises a conformal reflective layer 82 over the organic insulating layer 66, wherein the conformal reflective layer 82 serves as a reflector of light (pg. 12, ln. 12-15), and a planar color filter layer 84 over the conformal reflective layer 82, wherein the planar color filter layer 84 has a substantially planar upper surface and a bottom surface that conformably and fully covers the conformal reflective layer 82 (pg. 12, ln. 17-18). Each of the pixel portions further comprises a first transparent layer 86 conformably and directly on the planar color filter layer 84, wherein the first transparent conductive layer 86 is connected to a thin film transistor 68 for controlling the liquid crystal layer (pg. 12, ln. 19-23) and the conformal reflective layer 82 is electrically isolated from the transparent conductive layer (Figure 2).

The claimed subject matter of the present invention involved in the appeal, as recited in claim 67, is directed to a liquid crystal structure. The structure comprises a first substrate panel 50b, a second substrate panel 50a and a liquid crystal layer 54 disposed between the first and the second substrate panels 50b, 50a (pages 12-13). The structure also comprises a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer (pg. 12, ln. 20 to 24, Figure 2). Each of the pixel portions comprises an organic insulating layer 66 over the first substrate panel 50b, wherein a surface of the organic insulating layer comprises a bumpy surface (pg. 12, ln. 9-12). Each of the pixel portions also comprises a conformal reflective layer 82 over the organic insulating layer 66 (pg. 12, ln. 12-15), and a planar color filter layer 84 over the conformal reflective layer 82, wherein the planar color filter layer 84 has a substantially planar upper surface and a bottom surface that conformably covers the conformal reflective layer 82 (pg. 12, ln. 17-18). Each of the pixel portions further comprises a contact via (Figure 2) configured in the planar color filter layer 84, the conformal reflective layer 82 and the organic insulating film 66 (Figure 2), and a first transparent layer 86 conformably and directly on the planar color filter layer 84 (Figure 2), wherein the first transparent conductive layer 86 is connected to a thin film transistor 68 for controlling the liquid crystal layer (pg. 12, ln. 19-23) and the conformal reflective layer 82 is electrically isolated from the transparent conductive layer (Figure 2).

VI. Grounds of rejection to be reviewed on appeal

Were claims 56-59 and 62-67 properly rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada et al. (US 2002/0054257, hereinafter "Tanada") in view of Nakai et al. (US 6,144,429,hereinafter "Nakai")?

Were claims 56-59 and 62-67 properly rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada et al. (US 2002/0054257, hereinafter "Tanada") in view of Ogawa et al. (US6,122,027, hereinafter "Ogawai") and further in view of Nakai?

VII. Arguments

A. The related law

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006).

"The inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole for which patentability is claimed." Hartness International, Inc. Vs. Simplimatic Engineering Co., 819 F2d 1100, 1108, 2 USPQ 2D 1826 (Fed. Cir. 1987).

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

"Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blue print for piecing together the prior art to defeat patentability—the essence of hindsight". *In re Dembiczak*, 175 F.3d at 999.

"It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention using the Appellant's structure as a template and selecting elements

from the references to fill the gaps". *In re Gorman*, 933 F. 2d 982, 987, 18 USPQ 2d 1885 (Fed. Cir. 1991).

"Finally, if an independent claim is nonobvious under 35 U.S.C. 103 (or unanticipated under 35 U.S.C. 102), then any claim depending therefrom is nonobvious (or unanticipated)". *In re Fine*, 837 F.2d 1071, 5 USPQ2d, 1596 (Fed. Cir. 1988).

B. Grouping of the claims

For the first ground of rejection contested by the Appellants in this appeal, claims 56-59, 62-67 as one group, and independent claims 56 and 67 may be taken as the representative for the issue on appeal. For the second ground of rejection contested by Appellants in this appeal, claims 56-59, 62-67 as one group, and independent claims 56 and 67 may be taken as the representative for the issue on appeal.

C.

Claims 56-59, 62-67 were improperly rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada in view of Nakai.

1. The rejection

Claim 56 : In the Office Action mailed on December 11, 2008, Claims 56-59, 62-67 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada in view of Nakai. In making the rejection, the Examiner contends that Tanada discloses a liquid crystal structure (LCD) that comprises a first substrate panel, a second substrate panel and a liquid crystal layer 30 therebetween. The Examiner also contends that Tanada teaches each pixel portion that comprises an organic layer 11 (pg. 3, [0046]) wherein the surface of the organic insulating layer 11 has a plurality of protrude/recess structures thereon (Fig. 1). The Examiner further contends that Tanada also discloses a conformal reflective layer 12 over the organic insulating layer 11, and a transparent dielectric layer 13 and 14 which includes both the color filter layer 13 and the overcoat layer 14 over the conformal reflective layer 12. The Examiner asserts on page 4 of the Office Action that the dielectric layer is a color filter layer

comprising the overcoat layer that has a substantially planar surface. In the Response to Arguments, the Examiner alleges that color filter layers in the art have long comprised of clear regions, plnaarization portions, and opaque regions, and "layers" are often composite in nature. The Examiner further alleges that "an over coat layer would be considered obvious for a color filter layer with a planar (no-bump) top surface of applied Tanada (see planar top surface of 13 in Figure 1 of Tanada), and all applied prior art references have planar top surfaces". The Examiner then concludes that it has long been well known in the art that color filters planarize and deliberate process steps are needed to force such surfaces to be non-planar.

The Examiner alleges Nakai discloses a conductive layer 14 connected to the TFT 19 through a contact hole 22, a feature that is missing from Tanada.

Claim 67 : The Examiner asserts the color filter layer comprising overcoat layer of Tanada does completely cover the conformal reflective layer. The Examiner further asserts that the combination teaches the reflective layer covers the second terminal of the TFT, but it exposes the first terminal of the TFT to the color filter via the contact hole, and thus read on Appellant's "....first terminal of the thin film transistor is configured in the planar color filter layer while a second terminal of the thin film color filter layer is configured in the organic insulating layer."

2. The prior art

Tanaka teaches a liquid crystal display, as shown in Figure 1, that includes a pair of substrates 10, 20 oppose each other with a liquid crystal (LC) layer 30 therebetween [0034]. The liquid crystal display of Tanaka includes, at the LC layer 30 side of the first substrate 10, an organic film 11 for corrugating a reflection layer 12, a metallic reflection film 12 for reflecting light, and color filters 13 for performing color display, **an overcoat film 14** for protecting the organic film 11, the metallic reflection film 12 **as well as for planarizing the corrugation due to the organic film and the color filters 13** (see [0035]). The liquid crystal display also includes electrode layers 15 deposited on the overcoat film 14 for driving the liquid crystal layer 30, and an alignment film 16 thereon for controlling the liquid crystal layer 30. Tanaka also teaches at the LC layer 30 side of the second substrate 20, electrode layers 25, an overcoat film 24, and an alignment film 26 are deposited in that order.

The prior art Nakai in general teaches a TFT reflective LC display device with a reflecting electrode. Nakai teaches an active matrix device that includes a TFT located at each pixel intersection. More specifically, Nakai teaches a gate insulating layer 27 deposited over the entire surface over the substrate 17 covering the gate line 23 and the storage capacitor line 20; the drain electrode 24, the source electrode 25 and the signal line 26 formed on the gate insulating line 27; a flattening layer 21 formed overlying the TFT; a reflector layer 16 formed on the flattening layer 21; and a light scattering layer 15 formed overlying the reflector layer 16 and the flattening layer 21. Nakai further suggests a contact hole 22 to reach the source electrode 25, and the alleged contact hole 22 is formed in a scattering layer 15 and a flattening layer 21 (col. 15, ln. 4-46, Fig. 13).

3. The prior art differentiated

Claim 56 : Features of the currently pending independent claim 56 include: **1)** that a planar color filter layer over the conformal reflective layer, wherein planar color filter layer has a substantially planar upper surface and a bottom surface that conformably and fully covers the conformal reflective layer; and **2)** that a first transparent conductive layer conformably and directly on the planar color filter layer**,** wherein the first transparent conductive layer is connected to a thin film transistor for controlling the liquid crystal layer and the conformal reflective layer is electrically isolated from the first transparent conductive layer.

Appellants respectfully disagree with the Examiner's assertion that the color filters 13 and the overcoat layer 14 of Tanada formed thereon could be construed as comparable to the color filter layer of the invention.

One skilled in art may consider a color filter substrate be comprised of a color filter layer, a black matrix, and possibly an overcoat layer. A skilled artesian will not consider a color filter layer be comprised of a color filter layer, the black matrix, and an overcoat layer. Even according to the teachings of the references cited by the Examiner, both Tanada and Ogawa consider the color filter layer being just the color filter layer itself and not including an overcoat layer. In fact, Tanada specifically teach forming an overcoat layer to improve smoothness and increase of insulation of the color filter layer. As shown in Fig. 1 of Tanada and described in related paragraphs [0035] to [0038], at the liquid crystal layer 30 side of the first substrate 10, an organic film 11 for corrugating a reflection film 12, a metallic reflection film 12 for reflecting light entering the liquid crystal display, **color filters 13 for performing color display, an overcoat film 14 for protecting the organic film 11 and the metallic**

reflection film 12 as well as for planarizing the corrugation due to the organic film 11 and the color filters 13, electrode layers 15....are deposited in that order. In brief, Tanada teaches that an overcoat film 14 is formed on color filters 13 for planarizing the corrugation due to the organic film 11 and the color filters 13. According to the definition of Wikipedia, as presented in the Response dated September 12, 2008, a color filter layer is a transparent colored material that is used in theatre, event production, photograph, videography and cinematograph to color light and for color correction. Hence, even by the broadest interpretation, a color filter layer could not be construed to include an overcoat layer or a black matrix, and none of the cited reference teaches or suggests a color filter layer with a planar top surface and a non-planar bottom surface, and a transparent conductive layer directly on the planar color filter layer.

In the claimed invention, the planar color filter layer 84 is formed over the conformal (bumpy) reflective layer 82, and the planar color filter layer 84 has a bottom surface that can conformably and fully covers the conformal reflective layer (which means, the bottom surface of the planar color filter layer 84 is not smooth and has corrugation thereon) and has a substantially planar upper surface **to thereby compensate the corrugation of the underlying conformal reflective layer** and to **provide planarity for the first transparent conductive layer 86 formed directly thereon**. In brief, the planar color filter layer of the invention has the function of coloring light and for color correction, and further has the function of planarizing the bumpy reflective layer without the assistance of an overcoat film. Appellants respectfully remind the Examiner that an omission of an element with retention of the element's function is an indicia of unobviousness. See MPEP 2144.04 and *In re Edge*, 359 F.2d 896, 149 USPQ 556 (CCPA 1966).

The Appellants further submit the argument provided by the Examiner that "*..it has long been well known in the art that color filters planarize (form planar top surfaces despite non-planar bottom surface); deliberate process steps are needed to force such surfaces to be non-planar...*" is not well-substantiated for the reasons below. The Examiner errs in concluding that the top surface of color filters are naturally planarized even the bottom surface is non-planar and deliberate process steps are needed to force such surfaces to be non-planar. In the Invention Disclosure Statement submitted on Jan. 22, 2007 on a US patent 6597421 by Hatanaka et al., Hatanaka discloses a color filter layer having a non-planar bottom surface has a corresponding non-planar top surface and a flattened layer is provided thereton to obtain the desire planarity, while a color filter layer having a planar bottom surface has a planar top surface. Hence, the conventional arts, such as, Tananda, Ogawa

and Hatanaka, basically teach in order for a color filter layer to have a planar top surface, either the bottom surface thereof is planar or an overcoat layer is formed thereon.

Further, the present invention teaches that the first transparent conductive layer is formed conformably and directly on the planar color filter layer. Layers 15 of Tanada, which is alleged to be comparable to the first transparent conductive layer of the invention is not formed directly on the color filters 13.

Additionally, Tanada basically teaches a passive LCD device which comprises a grid of conductors with pixels located at each intersection in the grid and current is sent across two conductors on the grid to control the light for any pixel. The passive device of Tanada does not operate through any TFT. Further, in order for Tanada to connect to a TFT, a contact hole must be formed in the overcoat film 14, the reflection film 12, the color filters 13 and the organic film 11 of the passive LCD device of Tanada to expose a TFT, which would render Tanada's passive LCD device to operate improperly.

Claim 67 : In addition to the above discussion, neither Tanaka nor Nakai teaches or suggests that "...a first terminal of the thin film transistor (TFT) is configured in the planar color filter layer while a second terminal of the thin film transistor is configured in the organic insulating layer...". Instead, Nakai teaches that both electrodes 24 and 25 are configured in a same flattening layer, while Tanaka is completely silent about a TFT.

4. Even if combined Tanaka and Nakai

Since neither Tanaka nor Nakai teaches or suggests a planar color filter layer over the conformal reflective layer, wherein the planar color filter layer has a substantially planar upper surface and a bottom surface that conformably and fully covers the conformal reflective layer, and a first transparent conductive layer conformably and directly on the planar color filter layer, Appellants respectfully submit that claim 56 defines over the prior art references for at least the reasons discussed above. If the independent claim 56 is allowable over the cited references, its dependent claims 56-59, 62-66 are allowable as a matter of law, because these dependent claims contain all features of their respective independent claim 56.

Regarding independent claim 67, claim 67 provides the subject application with independent claims of varying scope and to additionally claim *a contact via configured in the planar color filter layer, the conformal reflective layer and the organic insulating film; a first*

transparent conductive layer over the planar color filter layer, wherein the first transparent conductive layer is connected to a thin film transistor through the contact via in the planar color filter layer, the conformal reflective layer and the organic insulating film, and a first terminal of the thin film transistor is configured in the planar color filter layer while a second terminal of the thin film transistor is configured in the organic insulating layer.

It is respectfully submitted that the LCD structure defined by claim 67 is neither disclosed nor suggested by the cited art of record, and is in condition for allowance for at least the above reasons supporting claim 56, as is described above. Further, none of the cited reference teaches a contact via (i.e. a contact hole) configured in the color filter layer, the conformal reflective layer and the organic insulating film.

Additionally, none of the cited reference teaches a first terminal of the TFT is being configured in the color filter layer while a second terminal of the TFT is being configured in the organic insulating layer. Even if there were motivation to combine Tanaka and Nakai, the combination would suggest forming both terminals of the TFT in a same layer. Hence, Applicants believe that the Examiner is arguing out of hindsight, finding pieces of the invention within the prior art and assembling them according to the teaching of the present invention. As a matter of fact, it would not have been obvious to people having ordinary skill in the art at the time the invention was filed to obtain the claimed invention merely by referring to the teachings of Tanaka and Nakai. Therefore, the obviousness rejection made by the Office is statutorily deficient, and people skilled in the art would have not been capable of amounting to the claimed invention at the time the invention was made by modifying the passive LCD device of Tanada with the TFT of Nakai. Accordingly, Appellants submit that claim 67 is also in condition for allowance.

5. Advantages and benefits can not be achieved by Tanaka and Nakai

At least one object of the present invention is to provide a liquid crystal display structure having much better legibility and display efficiency under any lighting levels and less misalignment in a liquid crystal layer and reduced liquid crystal cell gap non-uniformity problems.

In the present invention, the bumpy reflective layer 82 provides high reflectivity. The planar transparent conductive layer 86 provides uniform cell gap with less misalignment. The only one planar color filter layer 84 located between the bumpy reflectively layer 82 and the planar transparent conductive layer 86 provides a high reflective efficiency for an external

light by reflecting a high percentage colorful reflective light to the user. Therefore, a light loss of colorful reflective light in the reflection path can be minimized.

In Tanada, **the external light easily be reflected and losses in the corrugated interface between the overcoat film 14 and the color filters 13.** Hence, the purity of the colorful reflective light is therefore reduced because of mixing reflective external light. Minimization of the light loss for the colorful reflective light can not be achieved by the Tanada. In addition, Nakai does not teach a color filter layer between the reflector layer 16 and the transparent electrode 14, so that Nakai can not provide a colorful reflective light.

It is respectfully submitted that the LCD structure defined by claim 56 and 67 "as a whole" is neither disclosed nor suggested by the cited art of record, and is in condition for allowance for at least the above reasons described above.

D. *Claim 56-59 and 62-67 were improperly rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada et al. (US 2002/0054257, hereinafter "Tanada") in view of Ogawa et al. (US 6,122,027, hereinafter "Ogawai") and further in view of Nakai?*

1. The rejection

Claim 56 : In the Office Action mailed on December 11, 2008, Claims 56-59, 62-67 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tanada in view of Ogawa and Nakai. In making the rejection, the Examiner contends that Tanada discloses a liquid crystal structure (LCD) that comprises a first substrate panel, a second substrate panel and a liquid crystal layer 30 therebetween. The Examiner also contends that Tanada teaches each pixel portion that comprises an organic layer 11 (pg. 3, [0046]) wherein the surface of the organic insulating layer 11 has a plurality of protrude/recess structure thereon (Fig. 1). The Examiner further alleges that Tanada discloses a conformal reflective layer 12 over the organic insulating layer 11, and a transparent dielectric layer 13 and 14 which includes both the color filter layer 13 and the overcoat layer 14 over the conformal reflective layer 12. The Examiner asserts on page 9 of the Office Action that the transparent dielectric layer 14 is a color filter layer comprising the overcoat layer that has a substantially planar surface.

The Examiner recognizes Tanada does not disclose (1) a color filter layer NOT comprising an overcoat layer and (2) the first conductive layer is connected to the TFT for controlling the liquid crystal layer. The Examiner, nevertheless, contends that Ogawa teaches the missing features. The Examiner basically concludes that it is evidenced, based on Ogawa, to add color filters that do not comprise an overcoat layer as an art recognized color filter suitable for the purpose of producing color display, and this proves that the overcoat layer of Tanada is optional.

The Examiner also contends that Nakai teaches an LCD device having a first conductive layer 14 connected to the TFT 19 through the contact hole 22 and source electrode 25 for controlling the liquid crystal layer. The Examiner further contends that based on Nakai, workers of ordinary skill in the art would modify Tanada by adding a first conductive layer 14 connected to the TFT 19 through the contact hole 22 and source electrode 25 for controlling the liquid crystal layer to provide high efficiency of light utilization.

Claim 67 : The Examiner asserts the color filter layer comprising overcoat layer of Tanada does completely cover the conformal reflective layer. The Examiner further asserts that the combination teaches the reflective layer covers the second terminal of the TFT, but it exposes the first terminal of the TFT to the color filter via the contact hole, and thus read on Appellant's "....first terminal of the thin film transistor is configured in the planar color filter layer while a second terminal of the thin film color filter layer is configured in the organic insulating layer."

2. The prior art

Tanaka teaches a liquid crystal display, as shown in Figure 1, that includes a pair of substrates 10, 20 oppose each other with a liquid crystal (LC) layer 30 therebetween [0034]. The liquid crystal display of Tanaka includes, at the LC layer 30 side of the first substrate 10, forming an organic film 11 for corrugating a reflection layer 12, a metallic reflection film 12 for reflecting light, and color filters 13 for performing color display, **an overcoat film 14** for protecting the organic film 11, the metallic reflection film 12 **as well as for planarizing the corrugation due to the organic film and the color filters 13.** The liquid crystal display

also includes electrode layers 15 deposited on the overcoat film 14 for driving the liquid crystal layer 30, and an alignment film 16 thereon for controlling the liquid crystal layer 30 [0035]. Tanaka also teaches at the LC layer 30 side of the second substrate 20, electrode layers 25, an overcoat film 24, and an alignment film 26 are deposited in that order.

Ogawa teaches an active matrix array having reflective films 120 and a gate insulating film 133 formed in that order on a substrate 101. On the planar top surface of the gate insulating film 133 (Figure 8) color filters 103a-103c and black matrixes 131a-131c are formed. Then, the first transparent electrodes 105 are formed on color filters 103a-103c and black matrixes 131a-131c (col. 5, ln. 9-34).

Nakai in general teaches a TFT reflective LC display device with a reflecting electrode. Nakai teaches an active matrix device that includes a TFT located at each pixel intersection. More specifically, Nakai teaches a gate insulating layer 27 deposited over the entire surface over the substrate 17 covering the gate line 23 and the storage capacitor line 20; the drain electrode 24, the source electrode 25 and the signal line 26 formed on the gate insulating line 27; a flattening layer 21 formed overlying the TFT; a reflector layer 15 formed on the flattening layer 21; and a light scattering layer 15 formed overlying the reflector layer 15 and the flattening layer 21. Nakai further suggests a contact hole 22 to reach the source electrode 25, and the alleged contact hole 22 is formed in a scattering layer 15 and a flattening layer 21 (col. 15, ln. 4-46, Fig. 13).

3. The prior art differentiated

Claim 56 : Ogawa teaches a display having color filters that do not comprise an overcoat because the color filter of Ogawa has a planar bottom surface; and accordingly, the upper surface of the color filter of Ogawa is also correspondingly planar. However, the corrugated reflective layer in Tanada is used for improve reflectivity. Accordingly, there is no motivation to combine Tanada with Ogawa to reduce the reflectivity, since all layers of Ogawa are without bumpy surface. Hence, the application of an overcoat layer, as taught by Tanada for planarizing the corrugation due to the organic film and the color filters, can become optional in Ogawa. In other words, the teachings of Ogawa and Tanada suggest that when the color filter film does not have a planar bottom surface (and the upper surface thereof is also non-planar), an overcoat layer is required for planarization, whereas when the color filter film does have a planar bottom surface, an overcoat film can be optional. The present invention, however, teaches that even the planar color filter layer has a bumpy bottom

surface, i.e. does not have a planar bottom surface, the application of an overcoat film can still be obviated.

Further, as admitted by the Office, Ogawa teaches color filters that do not comprise an overcoat layer. In other words, color filters do not automatically imply an overcoat layer is included. Hence, the Office's assertion that a color filter layer means a color filter film plus an overcoat layer is inappropriate.

Moreover, Ogawa does not teach color filters having a non-planar bottom surface. Instead, Ogawa teaches color filters having a planar bottom surface. Hence, the top surface of the color filters could be correspondingly planar. The present invention teaches a color filter layer formed with a non-planar (bumpy) bottom surface but with a planar upper surface and an overcoat layer is obviated.

Regarding Nakai, as previously discussed, Tanada basically teaches a passive LCD device which comprises a grid of conductors with pixels located at each intersection in the grid and current is sent across two conductors on the grid to control the light for any pixel. The passive device of Tanada does not operate through any TFT. Further, in order for Tanada to connect to a TFT, a contact hole must be formed in the overcoat film 14, the reflection film 12, the color filters 13 and the organic film 11 of the passive LCD device of Tanada to expose a TFT, which would render Tanada's passive LCD device to operate improperly.

Claim 67 : In addition to the above discussion, neither Tanaka nor Nakai teaches or suggests that "…a first terminal of the thin film transistor (TFT) is configured in the planar color filter layer while a second terminal of the thin film transistor is configured in the organic insulating layer…". Instead, Nakai teaches that both electrodes 24 and 25 are configured in a same flattening layer, while Tanaka is completely silent about a TFT.

4. Even if combined Tanada, Ogawa and Nakai

In view of the foregoing, Appellants submit that even if Tanada is combined with Ogawa and Nakai, the combination still fails to explicitly teach or implicit suggest at least *a planar color filter layer over the conformal reflective layer (also having plurality of protrudes/recesses thereon), wherein the planar color filter layer has a substantially planar upper surface and a bottom surface that comformably and fully covers the conformal reflective layer* as substantially taught in claim 56. Hence, Appellants respectfully submit

that claim 56 defines over the prior art references for at least the reasons discussed above. If the independent claim 56 is allowable over the cited references, its dependent claims 57-59, 62-66 are allowable as a matter of law, because these dependent claims contain all features of their respective independent claim 56.

Ogawa teaches a display having color filters that do not comprise an overcoat because the color filter of Ogawa has a planar bottom surface; and accordingly, the upper surface of the color filter of Ogawa is also correspondingly planar. However, the corrugated reflective layer in Tanada is used for improve reflectivity. Accordingly, there is no motivation to combine Tanada with Ogawa to reduce the reflectivity, since reflectivity of Ogawa without bumpy surface is relatively lower than that of Tanada. In other words, **the teachings of Ogawa and Tanada suggest that when the color filter film does not have a planar bottom surface (and the upper surface thereof is also non-planar), an overcoat layer is required for planarization, whereas when the color filter film have a bumpy bottom surface.** Hence, an overcoat layer, as taught by Tanada for planarizing the corrugation due to the organic film and the color filters, can not be optional in Tanada. The present invention, however, teaches that even the planar color filter layer has a bumpy bottom surface, i.e. does not have a planar bottom surface, the application of an overcoat film can still be obviated and the transparent conductive layer can be directly formed on the planar color filter layer. Accordingly, there is no teaching, suggestion or motivation to combine Tanada and Ogawa for obtaining the present invention.

Regarding independent claim 67, claim 67 provides the subject application with independent claims of varying scope and to additionally claim *a contact via configured in the planar color filter layer, the conformal reflective layer and the organic insulating film; a first transparent conductive layer over the planar color filter layer, wherein the first transparent conductive layer is connected to a thin film transistor through the contact via in the planar color filter layer, the conformal reflective layer and the organic insulating film, and a first terminal of the thin film transistor is configured in the planar color filter layer while a second terminal of the thin film transistor is configured in the organic insulating layer.*

It is respectfully submitted that the LCD structure defined by claim 67 is neither disclosed nor suggested by the cited art of record, and is in condition for allowance for at least the above reasons supporting claim 56, as is described above. Further, none of the cited reference teaches a contact via (i.e. a contact hole) configured in the color filter layer, the conformal reflective layer and the organic insulating film.

Additionally, none of the cited reference teaches a first terminal of the TFT is being configured in the color filter layer while a second terminal of the TFT is being configured in the organic insulating layer. Even if there were motivation to combine Tanaka and Nakai, the combination would suggest forming both terminals of the TFT in a same layer. Hence, Applicants believe that the Examiner is arguing out of hindsight, finding pieces of the invention within the prior art and assembling them according to the teaching of the present invention. As a matter of fact, it would not have been obvious to people having ordinary skill in the art at the time the invention was filed to obtain the claimed invention merely by referring to the teachings of Tanaka and Nakai. Therefore, the obviousness rejection made by the Office is statutorily deficient, and people skilled in the art would have not been capable of amounting to the claimed invention at the time the invention was made by modifying the passive LCD device of Tanada with the TFT of Nakai. Accordingly, Appellants submit that claim 67 is also in condition for allowance.

5. Advantages and benefits can not be achieved by Tanaka, Ogawa and Nakai

At least an object of the present invention is to provide a liquid crystal display structure having much better legibility and display efficiency under any lighting levels and less misalignment in a liquid crystal layer and reduced liquid crystal cell gap non-uniformity problems.

In the present invention, the bumpy reflective layer 82 provides high reflectivity. The planar transparent conductive layer 86 provides uniform cell gap with less misalignment. The only one planar color filter layer 84 located between the bumpy reflectively layer 82 and the planar transparent conductive layer 86 provides a high reflective efficiency for an external light by reflecting a high percentage colorful reflective light to the user. Therefore, a light loss of colorful reflective light in the reflection path can be minimized.

In Tanada, **the external light easily be reflected and losses in the corrugated interface between the overcoat film 14 and the color filters 13.** Hence, the purity of the colorful reflective light is therefore reduced because of mixing reflective external light. Minimization of the light loss for the colorful reflective light can not be achieved by the Tanada.

Ogawa does not teach color filters having a non-planar bottom surface. Instead, Ogawa teaches color filters having a planar bottom surface. Ogawa does not teach a bumpy reflective layer, the reflective efficiency of the colorful reflective light to the user is relatively lower than a bumpy reflective layer.

In addition, Nakai does not teach a color filter layer between the reflector layer 16 and the transparent electrode 14, so that Nakai can not provide a colorful reflective light.

It is respectfully submitted that the LCD structure defined by claim 56 and 67 "as a whole" is neither disclosed nor suggested by the cited art of record, and is in condition for allowance for at least the above reasons described above.

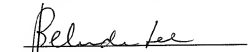
E. Conclusion

As noted, the Examiner has not properly applied 35 U.S.C. §103 in his rejections of the claims at issue. Accordingly, Appellants believe that the rejections under 35 U.S.C. §U.S.C. § 103 to be in error, and respectfully request the Board of Appeals and interferences to reverse the Examiner's rejections of the claims on appeal.

Respectfully submitted,

Date :

July 2, 2009



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VIII. Claims appendix

CLAIMS ON APPEAL:

Claims 1-23 (cancelled)

Claim 24. (withdrawn) A liquid crystal display (LCD) structure, comprising:

a first substrate panel with a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer, each of the pixel portions comprising:

an organic insulating layer over the first substrate panel, wherein the surface of the organic insulating layer has a plurality of protrude/recess structures or bumps;

a plurality of reflectors over the organic insulating layer such that portions of the organic insulating layer are exposed, wherein the reflectors exposes about 1 to 60% of the overall organic insulating layer area, the reflectors form a reflector of light and the exposed organic insulating areas form the transmission areas, and the reflectors and the exposed organic insulating areas are alternately laid with respect to each other;

a dielectric layer over the reflectors and the exposed organic insulating areas, wherein the upper surface of the dielectric layer is smoother than the protrude/recess structure of the organic insulating layer; and a first transparent conductive layer over the dielectric layer.

Claim 25. (withdrawn) The LCD structure of claim 24, wherein each protrude/recess structure may be divided into a first region and a second region depending on the viewing angle according to the following relationship:

assuming a beam of incoming light strikes a surface having protrude/recess structures covered by a reflective layer entirely and produces reflected lights, if the reflected lights distribute within a preferable observation range, the region in the protrude/recess structure that corresponds to such a range is defined to be the first region serving as the reflectors

region, and if the reflected light spreads outside the preferable observation range, the region in the protrude/recess structure that correspond to such difficult-to-see range is defined to be the second region where the reflectors are removed, and the exposed transmission areas are in the second region.

Claim 26. (withdrawn) The LCD structure of claim 24, wherein the LCD further includes a thin film transistor having a gate electrode, a source terminal and a drain terminal over the first substrate panel.

Claim 27. (withdrawn) The LCD structure of claim 24, wherein the dielectric layer includes a color filter layer.

Claim 28. (withdrawn) The LCD structure of claim 24, wherein the dielectric layer includes a transparent insulating material layer.

Claim 29. (withdrawn) The LCD structure of claim 24, wherein the LCD further includes:

a second substrate panel corresponding to the first substrate panel;

a second transparent conductive layer over the second substrate panel; and

a liquid crystal layer between the second transparent conductive layer and the first transparent conductive layer.

Claim 30. (withdrawn) The LCD structure of claim 29, wherein the LCD further includes a phase compensation plate and a polarizer on each exterior-facing side of the first substrate panel and the second substrate panel away from the liquid crystal layer.

Claim 31. (withdrawn) The LCD structure of claim 29, wherein the dielectric layer includes a transparent insulating material layer.

Claim 32. (withdrawn) The LCD structure of claim 31, wherein the LCD further includes a color filter layer between the second substrate panel and the second transparent conductive layer.

Claim 33. (withdrawn) The LCD structure of claim 29, wherein the LCD further includes a back lighting system attached to the side of the first substrate panel on the other side of the second substrate panel such that a portion of the emitted light from the back lighting system passes through the transmission electrode, and the remaining portion of the emitted light reflects back from the reflective electrode and reused.

Claim 34-43 (cancelled)

Claim 44. (withdrawn) A liquid crystal display (LCD) structure, comprising a first substrate panel, a second substrate panel, and a liquid crystal layer disposed between the first substrate panel and the second substrate panel, a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer, each of the pixel portions comprising

an organic insulating layer over the first substrate panel, wherein the surface of the organic insulating layer has a plurality of protrude/recess structures thereon;

a conformal reflective layer over the organic insulating layer, wherein the conformal reflective layer serves as a reflector of light;

a transparent dielectric layer over the conformal reflective layer, wherein the dielectric layer has a smoother upper surface than the bumpy organic insulating layer;

a first transparent conductive layer over the transparent dielectric layer; and

a liquid crystal alignment layer located between the first transparent conductive layer and the liquid crystal layer.

Claim 45. (withdrawn) The LCD structure of claim 44, wherein the material forming the organic insulating layer includes an acrylic resin.

Claim 46. (withdrawn) The LCD structure of claim 44, wherein the material forming the organic insulating layer includes a photosensitive resin.

Claim 47. (withdrawn) The LCD structure of claim 44, wherein the first substrate

panel further includes a thin film transistor having a gate electrode, a source terminal and a drain terminal over the first substrate panel.

Claim 48. (withdrawn) The LCD structure of claim 47, wherein the first transparent conductive layer is connected to the thin film transistor for controlling the liquid crystal layer.

Claim 49. (withdrawn) The LCD structure of claim 44, wherein the material forming the conformal reflective layer includes aluminum or silver or a reflective non-conducting material.

Claim 50. (withdrawn) The LCD structure of claim 44, wherein the transparent dielectric layer includes a color filter layer.

Claim 51. (withdrawn) The LCD structure of claim 44, wherein the transparent dielectric layer includes a transparent insulating material layer.

Claim 52. (withdrawn) The LCD structure of claim 44, wherein the LCD further includes:

a second substrate that is aligned to the first substrate panel;

a second transparent conductive layer over the second substrate panel; and

a liquid crystal layer between the second transparent conductive layer and the first transparent conductive layer.

Claim 53. (withdrawn) The LCD structure of claim 52, wherein the surface of the second substrate panel on the opposite side of the liquid crystal layer further includes a phase compensation plate and a polarizer.

Claim 54. (withdrawn) The LCD structure of claim 52, wherein the transparent dielectric layer includes a transparent insulating material layer.

Claim 55. (withdrawn) The LCD structure of claim 54, wherein the LCD further includes a color filter layer between the second substrate panel and the second transparent conductive layer.

Claim 56. (previously presented) A liquid crystal display (LCD) structure, comprising a first substrate panel, a second substrate panel, and a liquid crystal layer disposed between the first substrate panel and the second substrate panel, a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer, each of the pixel portions comprising:

an organic insulating layer over the first substrate panel, wherein a surface of the organic insulating layer has a plurality of protrude/recess structures thereon;

a conformal reflective layer over the organic insulating layer, wherein the conformal reflective layer serves as a reflector of light;

a planar color filter layer over the conformal reflective layer, wherein the planar color filter layer has a substantially planar upper surface and a bottom surface that conformably and fully covers the conformal reflective layer; and

a first transparent conductive layer conformably and directly on the planar color filter layer, wherein the first transparent conductive layer is connected to a thin film transistor for controlling the liquid crystal layer and the conformal reflective layer is electrically isolated from the first transparent conductive layer.

Claim 57. (previously presented) The LCD structure of claim 56, wherein the material forming the organic insulating layer includes an acrylic resin.

Claim 58. (previously presented) The LCD structure of claim 56, wherein the material forming the organic insulating layer includes a photosensitive resin.

Claim 59. (previously presented) The LCD structure of claim 56 further comprising a thin film transistor having a gate electrode, a source terminal and a drain terminal configured over the first substrate panel.

Claims 60-61. (cancelled)

Claim 62. (previously presented) The liquid crystal display (LCD) structure of claim 59, wherein the first transparent conductive layer is connected to the thin film transistor through a contact hole formed in the color filter layer.

Claim 63. (previously presented) The LCD structure of claim 56, wherein the first substrate panel includes a glass panel.

Claim 64. (previously presented) The LCD structure of claim 56, wherein a material for forming the conformal reflective layer includes aluminum or silver or a reflective non-conducting material.

Claim 65. (previously presented) The LCD structure of claim 56, wherein the LCD further includes:

a second substrate that is aligned to the first substrate panel;

a second transparent conductive layer over the second substrate panel; and

a liquid crystal layer between the second transparent conductive layer and the first transparent conductive layer.

Claim 66. (previously presented) The LCD structure of claim 65, wherein a surface of the second substrate panel on the opposite side of the liquid crystal layer further includes a phase compensation plate and a polarizer.

Claim 67 (previously presented) A liquid crystal display (LCD) structure, comprising a first substrate panel, a second substrate panel, and a liquid crystal layer disposed between the first substrate panel and the second substrate panel, a plurality of pixel portions being formed by respective electrodes for applying a voltage to the liquid crystal layer, each of the pixel portions comprising:

an organic insulating layer over the first substrate panel, wherein the organic insulating layer comprises a bumpy surface;

a conformal reflective layer over the bumpy surface of the organic insulating layer;

a planar color filter layer over the conformal reflective layer, wherein the planar color filter layer has a substantially planar upper surface and a bottom surface that conformably covers the conformal reflective layer;

a contact via configured in the planar color filter layer, the conformal reflective layer and the organic insulating film;

a first transparent conductive layer over the planar color filter layer, wherein the first transparent conductive layer is connected to a thin film transistor through the contact via in the planar color filter layer, the conformal reflective layer and the organic insulating film, and a first terminal of the thin film transistor is configured in the planar color filter layer while a second terminal of the thin film transistor is configured in the organic insulating layer.

IX. Evidence appendix

There is no evidence submitted pursuant to §§ 1.130, 1.131, or 1.132 of this title or of any other evidence entered by the Office and relied upon by appellant in the appeal, along with a statement setting forth where in the record that evidence was entered in the record by the Office.

V. Related proceedings appendix

There are no decisions rendered by a court or the Board in the proceeding identified in the Related Appeals and Interferences section of the brief.